Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #1 - Mulch till-Basic

Scenario Description:

Mulch-till is managing the amount, orientation and distribution of crop and other plant residue on the soil surface year round while limiting the soil-disturbing activities used to grow crops in systems where the entire field surface is tilled by the planter/drill or tillage tools prior to planting. This practice includes tillage methods commonly referred to as mulch tillage or chiseling and disking. It applies to stubble mulching on summer-fallowed land, to tillage for annually planted crops and to tillage for planted crops and to tillage for planting perennial crops. All residue shall be uniformly spread or managed over the surface throughout critical wind erosion period. All residue shall be uniformly distributed over the entire field and not burned or removed. These periods of intensive tillage have led to excessive soil loss, often above the Soil Loss Tolerance (T), due to the loss of critical crop residue. The RUSLE2 or WEPS model will be used to review the farming operation and determine if enough residue is being retained, throughout the rotation, to keep soil loss below T. The producer will then remove operations, or select alternate operations, to reduce erosion below T.

Before Situation:

Row crops such as corn, soybeans, or cotton are grown and harvested in mid-late fall. Fields are disked immediately following harvest, with rows in some fields being hipped for drainage. Residue amounts after harvest average 30% or less, resulting in bare soil being exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Over the winter residue degrades and sediment/nutrient runoff from fields increases. Sheet and rill erosion occurs with visible rills by spring. Spring tillage and seedbed preparation activities occur as early as possible in the late winter and early spring. Weed control is accomplished primarily through tillage, requiring multiple operations. Runoff from the fields flows into streams, water courses or other water bodies causing degradation to the receiving waters. Soil health (soil organic matter) declines over time as a result of tillage practices, low residue monocultures, and long periods of bare soil.

After Situation:

Mulch tillage applies to all cropland and other lands where crops are planed. It applies to stubble mulching on summer fallowed land to tillage for annually planted crops and to tillage for plating perennial crops. It also includes some planting operation such as hoe drill, air seeder and no-till drill that disturbs a large percentage of soil surface using the planting operation. Tillage occurs after crop harvest. In warmer areas, winter weeds or cover crops grow throughout the winter months. The residue that remains on the soil surface provides soil cover during late fall, throughout the winter, and into the early spring. Runoff and erosion are reduced. Wind erosion is reduced by standing residues. Winter weeds or the cover crop is terminated with tillage, a roller-crimper, shredding, or a combination of these methods prior to spring planting as late as feasible. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity in the cropping system.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $4,148.00 **Scenario Cost/Unit:** $41.48

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$18.51	50	$925.50
Seeding Operation, No Till/Strip Till Planter	1230	No Till/Strip Till row planters for seeding. Includes all costs for equipment, power unit, and labor.	Acre	$16.35	50	$817.50
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$9.66	100	$966.00
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$14.39	100	$1,439.00

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #2 - Mulch till-Drill Only

Scenario Description:

Mulch-till is managing the amount, orientation and distribution of crop and other plant residue on the soil surface year round while limiting the soil-disturbing activities used to grow crops in systems where the entire field surface is tilled by the planter/drill or tillage tools prior to planting. This practice includes tillage methods commonly referred to as mulch tillage or chiseling and disking. It applies to stubble mulching on summer-fallowed land, to tillage for annually planted crops and to tillage for planted crops and to tillage for planting perennial crops. All residue shall be uniformly spread or managed over the surface throughout critical wind erosion period. All residue shall be uniformly distributed over the entire field and not burned or removed. These periods of intensive tillage have led to excessive soil loss, often above the Soil Loss Tolerance (T), due to the loss of critical crop residue. The RUSLE2 or WEPS model will be used to review the farming operation and determine if enough residue is being retained, throughout the rotation, to keep soil loss below T. The producer will then remove operations, or select alternate operations, to reduce erosion below T.

Before Situation:

Row crops such as corn, soybeans, or cotton are grown and harvested in mid-late fall. Fields are disked immediately following harvest, with rows in some fields being hipped for drainage. Residue amounts after harvest average 30% or less, resulting in bare soil being exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Over the winter residue degrades and sediment/nutrient runoff from fields increases. Sheet and rill erosion occurs with visible rills by spring. Spring tillage and seedbed preparation activities occur as early as possible in the late winter and early spring. Weed control is accomplished primarily through tillage, requiring multiple operations. Runoff from the fields flows into streams, water courses or other water bodies causing degradation to the receiving waters. Soil health (soil organic matter) declines over time as a result of tillage practices, low residue monocultures, and long periods of bare soil.

After Situation:

Mulch tillage applies to all cropland and other lands where crops are planed. This scenario includes the use of a high distubance drill, such as a hoe drill that disturbs a large percentage of soil surface using the planting operation. In warmer areas, winter weeds or cover crops grow throughout the winter months. The residue that remains on the soil surface provides soil cover during late fall, throughout the winter, and into the early spring. Runoff and erosion are reduced. Wind erosion is reduced by standing residues. Winter weeds or the cover crop is terminated with planting or a roller-crimper, shredding, or a combination of these methods prior to spring planting as late as feasible. Over time, soil health is improved due to the additional biomass, ground cover, soil infiltration, and plant diversity in the cropping system.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 100

Scenario Cost: $1,851.00 **Scenario Cost/Unit:** $18.51

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$18.51	100	$1,851.00

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #3 - Mulch till-Adaptive Management (Limited Acreage Strip Trial)

Scenario Description:

The practice scenario is for the implementation of mulch till in small replicated plots to allow the producer to learn how to manage mulch till on their operation. Scenario includes implementing replicated strip trials on a field plot to evaluate, identify and implement a particular mulch till management strategy (e.g., mulch till vs conventional till, two different mulch till systems, etc.) This will be done following the interim guidance for mulch till adaptive management to be issued to all field offices for FY15.

Before Situation:

Row crops such as corn, soybeans, or cotton are grown and harvested in mid-late fall. Fields are disked immediately following harvest, with rows in some fields being hipped for drainage. Residue amounts after harvest average 30% or less, resulting in bare soil being exposed to wind erosion and/or intense rainfall during the fall, winter, and early spring. Over the winter residue degrades and sediment/nutrient runoff from fields increases. Sheet and rill erosion occurs with visible rills by spring. Spring tillage and seedbed preparation activities occur as early as possible in the late winter and early spring. Weed control is accomplished primarily through tillage, requiring multiple operations. Runoff from the fields flows into streams, water courses or other water bodies causing degradation to the receiving waters. Soil health (soil organic matter) declines over time as a result of tillage practices, low residue monocultures, and long periods of bare soil. The producer is considering using mulch till technology, but is unsure how to manage on their operation or needs to improve the management of mulch till to be successful.

After Situation:

Installation of this scenario will result in establishment of mulch till replicated plots to compare to different management strategies for mulch till and other residue management strategies following the guidance in the Agronomy Technical Note 11 - Adaptive Management and the Interim Guidance for Mulch Till Adaptive Management to be issued to all field offices for FY15. Implementation involves establishing the replicated plots to evaluate one or more no till management strategies. The plot will consist of at least 4 replicated plots designed, laid out, managed and evaluated with the assistance of a consultant knowledgeable in mulch till management. Results are used to make no till management decisions to address erosion, soil health, and water quality issues. Yields will be measured and statistically summarized following the procedures in Agronomy Technical Note 11 - Adaptive Management. The yields for each plot will be adjusted to the appropriate moisture content. This would be repeated for 3 years.

Scenario Feature Measure: Area planted

Scenario Unit: Acre

Scenario Typical Size: 15

Scenario Cost: $4,524.45 **Scenario Cost/Unit:** $301.63

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Seeding Operation, No Till/Grass Drill	960	No Till drill or grass drill for seeding. Includes equipment, power unit and labor costs.	Acre	$18.51	15	$277.65
Seeding Operation, No Till/Strip Till Planter	1230	No Till/Strip Till row planters for seeding. Includes all costs for equipment, power unit, and labor.	Acre	$16.35	15	$245.25
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$9.66	15	$144.90
Tillage, Primary	946	Includes heavy disking (offset) or chisel plow. Includes equipment, power unit and labor costs.	Acre	$14.39	15	$215.85
Labor						
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$100.73	30	$3,021.90
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	$20.63	30	$618.90

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #1 - No Burn/Sweep Beds - Sugarcane

Scenario Description:

In this scenario, sugarcane producers will be migrating from a system of burning residue immediately after harvest in the fall and winter to a system that discontinues burning and allows residue to be swept into furrows. No burning will take place during the management period. Adopting this system will improve soil quality, reduce erosion, and improve air quality in sensitive areas.

Before Situation:

Sugarcane residue is typically burned immediately after harvest in the fall and early winter. After burning, beds may be reshaped with tillage. Any crop residue that is present degrades and sediment/nutrient runoff from fields increases during rainfall events. Sheet and rill erosion occurs with visible signs of soil erosion by spring. Sensitive receptors near sugarcane fields will be exposed to increased particulate matter and degraded air quality during burning events.

After Situation:

After harvest in the fall or winter, residue will be swept from the sugarcane row tops into the furrows. Residue will not be burned. In the early spring, row reshaping (off-bar and layby tillage) will occur as necessary. Over time, soil health is improved due to the additional crop residues, ground cover, and soil infiltration.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $1,998.57 **Scenario Cost/Unit:** $33.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Tillage, Light	945	Includes light disking (tandem) or field cultivator. Includes equipment, power unit and labor costs.	Acre	$9.66	60	$579.60
Foregone Income						
FI, Sugarcane 4 year rotation	2077	Sugarcane is Primary Crop	Acre	$472.99	3	$1,418.97

Practice: 345 - Residue and Tillage Management, Reduced Till

Scenario: #1 - Chemical Fallow - Sugarcane

Scenario Description:

In sugarcane, cultivation activities that typically take place during the period between the last ratoon harvest and field preparation activities for planting sugarcane (fallow period) will all be replaced the use of herbicides. After fall burning of residue, herbicides will be used exclusively to control problem weeds like bermudagrass and to terminate resprouting sugarcane. Residue remaining after the fall/winter burn, along with the root system, will help to maintain soil structure, reduce erosion, and reduce sedimentation.

Before Situation:

After the last ratoon sugarcane harvest, weeds are usually controlled with aggressive tillage in the winter, spring, and summer leading up to ground preparation activities for the new crop of sugarcane. Tillage events destroy the soil structure and accelerate residue decomposition, leading to excessive erosion and sedimentation.

After Situation:

After harvest and a low-medium intensity burn, no tillage activities will take place until plant cane seedbed preparation activities in the late summer and early fall. Herbicides will be used exclusively to both suppress problem weeds and terminate the existing sugarcane crop. Erosion will be significantly reduced, soil structure will be better maintained, and sedimentation will be reduced.

Scenario Feature Measure:

Scenario Unit: Acre

Scenario Typical Size: 60

Scenario Cost: $957.60 **Scenario Cost/Unit:** $15.96

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price ($/unit)	Quantity	Cost
Equipment/Installation						
Chemical, ground application	948	Chemical application performed by ground equipment. Includes equipment, power unit and labor costs.	Acre	$5.32	180	$957.60